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ABSTRACT

A study examined a vowel alternation occurring in Philadelphia English and some dialects of New York State. The alternation is of [E] and [ae], and the study investigated the application of the [ae] Tensing Rule, more specifically in the interaction of [ae] Tensing with several principles of syllabification and grammatical organization. Issues addressed include the distribution's compatibility with the principle of Structure Preservation, the use of the notion of word cycle to explain asymmetry between words with Level 1 affixes and forms with Level 2 affixes, and comparative syllabification of Level 1 and 2 affixes. Two possible analyses of English Ablaut are offered. Data from Palestinian and Bedouin Hajazi Arabic are used to support the analysis' applicability beyond the scope of English. (MSE)

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Low Front Vowel Tensing in Lexical Phonology.

Elaine R. Dunlap
UMass/Amherst
January, 1988

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1. Introduction

In this paper I will investigate a vowel alternation occurring in Philadelphia English and some dialects of New York State (e.g. Long Island). See Ferguson (1972), Payne (1980), and Labov (1981) for discussion of the Philadelphia dialect, and Kahn (1976), Labov (1981) and Schwarzschild (1985) for New York English. Observe the distribution of [E] and [æ] in (1):

(1)	a.	[mEs]	'mass'	(where [E] = a raised,tensed
	b.	[mæsIv]	'massive'	diphthongized front un-
	c.	[mEsIŋ]	'massing'	rounded vowel)

Considering first (1) a. and b., we see that [E] appears before tautosyllabic [s] while [æ] is in an open syllable. This contrast suggests that a phonological rule tensing /æ/ before tautosyllabic [s] might be involved. The contrast between b. and c., however, appears inconsistent with such a conclusion. The surface syllabification of the two forms is identical, but the vowels differ. What distinguishes b. from c. is the morphological status of their suffixes. The form in b. has a Level 1 suffix while c. has a Level 2 suffix. This division of affixes into levels was developed in Chomsky and Halle (1968), Siegel (1974), Allen (1978),

Selkirk (1982) and Kiparsky (1982).

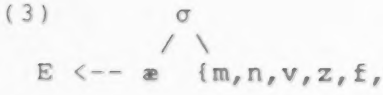
The central problem of this paper is: Where does the [æ] Tensing Rule apply? In answering this question, I will be investigating the nature of lexical/post-lexical rule distinction as developed within the framework of Lexical Phonology (Kiparsky 1982,85). The problem is primarily a theory-internal one: the Tensing rule is not stucture preserving, as [E] is (by hypothesis) not in the underlying phoneme inventory. In Kiparsky's framework, Structure Preservation is a principle which holds of lexical rules. Therefore, one might expect Tensing to be a postlexical rule. I will argue, however, that Tensing applies in the lexicon at Level 2 rather than post-lexically, but that it is still compatible with Structure Preservation because SP holds only at Level 1.

2. New York English: [æ] Tensing

The alternations in (2) motivate a syllable-sensitive rule of [æ] Tensing. The a. forms have a following consonant which is tautosyllabic with underlying [æ], realized as [E]. In the b. forms, the conditioning consonant is the onset to the following syllable and the vowel surfaces as [æ].

(2)a.graph	[grEf]	b.graphic	[græfɪk]
psychopath	[saykopEθ]	psychopathic	[saykopæθɪk]
mass	[mEs]	massive	[mæsɪv]
class	[klEs]	classical	[klæsɪk̩]
pass	[pEs]	passive	[pæsɪv]
canN	[kEn]	cannibal	[kænəb̩]
		Janice	[ǰænɪs]
		cafeteria	[kæfətiria]

The formulation of the Tensing rule shown in (3) is taken from Schwarzschild (1985).

(3)


The class of conditioning segments, while difficult to characterize in terms of features, can be defined on the sonority hierarchy in the following way (with exceptions to be discussed): The consonants which lie between (but do not include) the liquids and the voiceless stops induce Tensing. [r,l,p,t,č,k] are excluded by this definition. [h] and [ð] are not exceptions because they never occur syllable-finally after [æ]. For this rule, [ŋ] unexpectedly does not group

with the other nasals. This may be because (at least for this rule) it is more sonorous, and so it groups with the liquids in sonority. Alternatively, it is conceivable that [ŋ] induces other changes in the vowels which precede it. Since the environment preceding [ŋ] is more specific than the environment for the Tensing rule, it is expected (by the Elsewhere Condition of Kiparsky) that the more specific rule holds, and the Tensing rule does not apply. A dictionary search revealed only one example of [æ] before tautosylabic [ž], in the word cashmere. One can draw no conclusions about whether [ž] actually conditions Tensing or not based on an isolated non-native form. [ž] should therefore be grouped with [h] and [ð] since it does not occur syllable finally after [æ] in native vocabulary. All other consonants condition Tensing. These facts are summarized in (4), where "*" means that the consonant does not cause Tensing.

(4)

Consonants	Sonority Hierarchy
	vowels
*w,*y	glides
*l,*r	liquids
	----------
m,n,*ŋ	nasals
v,*ð,z,*ž	voiced fricatives
f,θ,s,š,*h	voiceless fricatives
b,d,ǰ,g	voiced stops
	----------
*p,*t,*č,*k	voiceless stops

Notice that in (2) b., Rule (3) fails to apply both in underived words (cannibal, Janice, cafeteria, passive) and in words with a Level 1 suffix (graphic, psychopathic, massive, classical). By examining words with Level 2 affixes we can see that Rule (3) applies in these forms (a more extensive list of data can be found in the Appendix on page 37.):

(5)

graphable	[grEfəbl̩]
massing	[mEsIŋ]
massable	[mEsəbl̩]
classing	[klEsIŋ]
classable	[klEsəbl̩]
classy	[klEsi]
passable	[pEsəbl̩]
passing	[pEsiŋ]
laughable	[lEfəbl̩]
laughing	[lEfiŋ]
laugher	[lEfɚ]
planner	[plEnɚ]
scanner	[skEnɚ]

What needs to be explained is the reason why Tensing does

not apply in the forms in (2)b. but does in the forms in (5). In Section 2.1, I will present evidence against a post-lexical analysis of Tensing, and then I will discuss where in the lexicon it occurs.

2.1 Why Tensing isn't Post-lexical

The contrast between (1)b. and c. (or between (2)b. and (5))) is already evidence that the Tensing rule cannot be post-lexical. On leaving the lexicon, massive and massing have the same syllabification. This identity of syllabification before -ive and -ing is suggested by the fact that flapping occurs in both comba[D]ive and comba[D]ing. Flapping has been argued by Selkirk (1978) and Kahn (1976) to be a postlexical syllabically conditioned rule. Although the particular analysis of Flapping is not important for the point being made here, the fact that the positions before -ive and -ing are the same syllabically is. If massive and massing have the same surface syllabification, then a post-lexical Tensing rule would have no way of distinguishing between the two forms. The rule should apply in neither form or in both. This is not the case, since rule (3) applies in massing, but not in massive.

Two classes of exceptions also provide evidence against

post-lexical Tensing. First, ablauted verbs (to be discussed in more detail in Section 2.3.2) do not undergo Tensing, although on the surface they fit the structural description. Ran, began and swam all have the vowel [æ]. A post-lexical tensing rule would apply after these forms have exited the lexicon, tensing the vowel. Second, clipped forms such as Cath (for Cathy) and caf (for cafeteria) do not undergo the Tensing rule. Post-lexical application would predict [E] in these forms, since they presumably exited the lexicon with the final consonant fully visible to the phonology. (Clipping will be discussed further in Section 2.3.3).

So far I have argued that although [æ] Tensing in New York English is not structure preserving, it nevertheless cannot be analyzed as a post-lexical rule since such an analysis cannot account for the difference between Level 1 and 2 affixed forms and for the exceptional behavior of ablauted verbs and clippings. If the rule applies in the lexicon, then where does it apply? My hypothesis is that the æ Tensing rule applies at a point in the derivation where the syllabification of b. and c. differs, specifically with regard to the following consonant which conditions the change. I will show that although this rule might at first glance appear to apply in Level 1, such an analysis presents

two problems for well-supported premises of Lexical Phonology: 1) It requires extrametrical segments to play a role in a phonological rule (conditioning the tensing of æ), and 2) It violates Structure Preservation. I will then reanalyze the Tensing rule as a cyclic Level 2 phenomenon, using properties of level-ordered morphology, syllabification, and the Strict Cycle to explain the facts.

2.2 A Preliminary Proposal--Tensing in Level 1

The first analysis which I will consider is one in which the æ Tensing Rule occurs in Level 1 after the suffixes in (2)b. have been added[1]. Below is a derivation:

(5)

	classic	classing	
Level 1			
cycle 1	klæ(s)	klæ(s)	
cycle 2	klæ.sI(k)	klæ(s)	Affix.,Syllab.
	d.n.a.	klE(s)	Tensing
Level 2			
cycle 1	---	klE.sIŋ	Affix., Syllab.

At Level 1 cycle 1, classic and classing are identical

---

[1]Kiparsky proposed a similar solution in a 1982 Colloquium lecture at UMass.

(and also indistinguishable from class), with final consonant extrametricality holding through Level 1. Tensing must not occur on this cycle or else it would apply to both forms. Affixation and CV Syllabification occur in classic on cycle 2. At this point, the two forms differ, and this is where Tensing applies, changing /æ/ in the root form of classing to [E]. It does not apply in classic because the conditioning [s] is already part of the following syllable. Then Level 2 affixation and CV Syllabification take place.

There are (at least) two problems with this analysis. One is that final consonants are extrametrical at Level 1, so the structural description of Rule (3) is not actually met in the Level 1 form of classic. That is, the consonant which in (5) conditions the change in the Level 1 form of classic is claimed to be invisible to the phonology at that level. Perhaps this is not a problem as long as extrametricality is not distinct from tautosyllabicity[2]. In other words, extrametrical segments may be considered tautosyllabic with the vowel which precedes them because they are not explicitly part of another syllable.

Another problem arises within the framework of

2This possibility was pointed out to me by John McCarthy.

Lexical Phonology. Rules like (3) which introduce a distinction not present in the lexicon are not structure preserving. Structure Preservation can be stated as follows:

(6) Lexical rules may not mark features which are non-distinctive3, nor create structures which do not conform to the basic prosodic templates of the language (ie. syllable and foot templates). (Borowsky, 1986 taken in part from Kiparsky, 1984)

Since [E] is a predictable variant of /æ/, Rule (3) marks a feature [+tense] which is non-distinctive, and therefore is not permitted by the theory to be a lexical rule.

The idea behind Structure Preservation is that in any given derivation, the first task is to establish the phonemes involved. Only after the phoneme-producing rules have applied may the rules which produce non-phonemes apply. This split between the two kinds of rules was roughly captured in the Structuralist tradition by a distinction between morphophonemic rules and phonemic rules, the former

3That is, non-distinctive for the particular phoneme in question. For instance, although the feature [+tense] may be distinctive for the high front vowels ([i] and [I]), it is not distinctive for the non-high front vowels ([æ] and [E]).

applying before the latter. The Lexical Phonology counterpart requires that the featural segment inventory which holds at the deepest level of representation (UR) must be maintained throughout the lexical derivation--that is, throughout Level 1. (See Borowsky (1986) for arguments that Level 2 is not structure preserving.)

Structure Preservation prevents rules like Flapping from applying in the lexicon. Flapping introduces a non-distinctive element [D] in roughly the following environment:

(7) $\acute{V}.\{t,d\}\breve{V}$

that is, when [t] or [d] is preceded by a stressed vowel and followed by an unstressed vowel. The Level 1, Cycle 1 form of atomic consists only of the root atom. Although the structural description of the Flapping rule is met, SP blocks application of the rule in the lexicon. If Flapping had occurred in Level 1, then the form [əDamIk] would be predicted (Borowsky p. 35-36).

In this section I have outlined and raised objections to one solution to the æ Tensing problem. Based on an asymmetry between forms with Level 1 affixes and forms with Level 2 affixes, I explored the possibility that Tensing is

a Level 1 rule, applying after Level 1 affixation has taken place. The objections were the following: First, the analysis has the undesirable consequence of requiring extrametrical elements to play a role in a phonological rule. Second, ~~æ~~ Tensing is not a structure preserving rule, and the theory of Lexical Phonology does not allow such rules in the lexical (Level 1) phonology.

2.3 A New Proposal: Tensing in Level 2

I will now consider an alternative analysis in which Rule (3) does not apply in Level 1, but rather in Level 2 on the word cycle before Level 2 affixation has taken place. Motivation for this cycle is discussed in section 2.3.1 below and in Selkirk, (1982, 84) and Borowsky (1986). Unlike the analysis in Section 2.2, this analysis does not rely on extrametrical segments to condition a phonological rule, nor does it require the introduction of nondistinctive elements in Level 1.

Consider the derivation in (8):

(8)

	classic		classing
Level 1			
cycle 1	klæ(s)		klæ(s)
cycle 2	klæ.sI(k)	Affix/Syllab	--
Level 2			
cycle 0	klæ.sIk		klæs
	dna	æ Tensing	klEs
cycle 1	--	Affix/Syllab	klE.sIŋ

On the first cycle, the two forms are identical. Level 1 affixation and CV syllabification occur on cycle 2 in classic. The 0 cycle at Level 2 involves only material from Level 1 without extrametricality of final consonants. Tensing does not apply in classic because the s is not tautosyllabic with æ. Tensing does apply in classing before its affix is added, however, and then the Level 2 affix is added and syllabified with the [s] as onset.[4]

4There is an alternative way to achieve the asymmetry between these two forms without positing a word cycle in Level 2. Suppose one difference between Level 1 and Level 2 affixed forms is that Level 2 affixes do not undergo automatic CV syllabification with the final consonant of the

2.3.1 Evidence for the Word Cycle

Borowsky (1986) presents evidence for the word cycle at Level 2 in the form of several rules which produce alternations strikingly similar to those for New York and Philadelphia æ. That is, they apply to level 2 forms but not to Level 1 forms. I refer the reader to Borowsky for the full analysis. Here I will present examples of data for three rules which she discusses.

Sonorant Syllabification:

(9)

$$\begin{matrix} N \\ : \\ [+son] \end{matrix} \quad]$$

The alternations follow: (Borowsky p.233)

---

root as onset. In this case the Level 2 cycle 1 form for classing will be [klæs.in] rather than [klæ.siŋ], and the Tensing rule will apply, with [klEs.iŋ] as output. Thus, Level 2 forms "remember" the syllabification of their root forms longer than Level 1 forms do. It would then be necessary to apply the CV rule to "fix" the syllabification of the Level 2 form, deriving [klE.siŋ]. In Section 4.3 I will use evidence from Arabic stress to argue against this view.

(10)

	[+syllabic] (Level 2)	[-syllabic] (Level 1)
a. wonder	wondering	wondrous
b. cycle	cycling	cyclic
c. theatre	Theatre-arts	theatrical
d. meter	metering	metric, metrical
e. rhythm	rhythm and blues	rhythmic,rhythmicity

This rule, which syllabifies final sonorants, does not apply at Level 1 because such an application would violate Structure Preservation. SP rules out any rule which introduces a distinction which does not occur underlyingly, and since sonorants do not contrast with respect to syllabicity in UR, rule (3) cannot apply. However, it crucially must apply before Level 2 affixation and compounding since otherwise the word-final environment would not be met. Moreover, in the forms with vowel-initial Level 2 affixes, the consonant would have been syllabified with the affix if sonorant syllabification had not applied first.[5]

5This would not be the case if Level 2 affixes do not syllabify with the root consonant as mentioned in Footnote 4.

(11) n-Deletion: n --> ϕ/ m__]

Examples:

Unaffixed	[ϕ] (Level 2)	[n] (Level 1)
condemn	condemning	condemnation
damn	damning	damnation, damnable
autumn	autumny	autumnal
hymn	hymn-enthusiast	hymnal

This rule does not apply at Level 1 because the final [n] is extrametrical at that level until an affix is added (right column). In those cases, the final [n] is resyllabified as the onset to the first syllable of the Level 1 affix. Only at Level 2 does the final consonant become visible in the two left-most columns. As with Sonorant Syllabification, Rule (3) applies before affixation, that is, on the word cycle (middle column) since otherwise the [n] would syllabify with the affix.

The last rule I will discuss is Voiced Obstruent Deletion, which occurs following nasals in syllable final position:

(12)

Voiced Obstruent Deletion:

$$\begin{bmatrix} \text{son} \\ \text{-cor} \\ \text{+voice} \end{bmatrix} \text{ --> } \phi / \text{ [+nasal]__]}\sigma$$

Examples:

Unaffixed	[ϕ] (Level 2)	[ŋg/b] (Level 1)
strong	strong-arm	stronger, strongest
long	longing	elongate, longer
bomb	bombing	bombard

Again, the same alternation exists, providing additional data for the argument that some rules are "word-boundary" rules which apply on the first cycle of Level 2, before affixation has taken place.

Perhaps it should be noted that all of these rules including Tensing are instantiations of a single phenomenon: when extrametricality is lost at the end of Level 1, a syllable sensitive rule applies to the new syllable structure, yielding an output distinct from its application to the Level 1 form. Given this observation, the word cycle functions as a formal device to account for the difference in the application of these rules to Level 1 and Level 2 forms.

2.3.2 Ablaut

Given an analysis in which [æ] tensing occurs in

Level 2, it is necessary to explain the Ablaut facts mentioned in Section 2.1. Why doesn't rule (3) apply in began, ran and swam? First note that these forms virtually exhaust the ablauted verbs which fit the S.D. for the rule. The only other candidates are archaic: hast, hath and bade (with /æ/, not /e/), and so are not part of the native vocabulary of most speakers.

There is some question about whether an "analysis" of Ablaut is in order. Since these forms constitute a limited class, a reasonable hypothesis might be that each form is learned as an individual lexical item. Two pieces of evidence, however, argue in favor of treating Ablaut as a semi-productive subsystem of English morphology. One is the fact that children often overgeneralize forms such as "bring, brang, brung" based on other verbs like "sing, sang, sung". The second is the fact that Ablauted forms systematically behave differently with respect to æ Tensing in New York and Philadelphia English. Perhaps a third kind of evidence is the fact that vowel alternations in English are extremely widespread, infiltrating grammatical systems (sing/sang, foot/feet, melt/molten) as well as other word formation processes (chit-chat, ziqzaq, teeter-totter, ding-dong. (See Wescott (1980) for a descriptive typology of English vowel alternations.)

Assuming now that some kind of analysis of Ablaut is appropriate, there is more than one possibility for what that analysis might be. Kiparsky (1982,p.12) argues on the basis of the distribution of zero derivation forms that Ablaut occurs at Level 1. If this turns out to be true, then we must explain why Tensing at Level 2 does not apply to the ablauted forms derived at Level 1. In recognition of the fact that Ablaut shares certain characteristics with other nonconcatenative systems, let us consider a tier analysis of these forms. In this approach, the past tense /æ/ morpheme is located on a separate tier from the root morpheme which contains an unspecified V slot in the underlying representation and all the way through the lexical phonology including level 2. The present tense morpheme will also be specified on a separate tier rather than as part of the root. For example, the present tense morpheme will be /I/ for swim and begin, and /ʌ/ for run. In other words, the features for the particular tense morphemes must be specified in the lexicon for each root, since they are not predictable. This differs from the Semitic morphology of which I am aware. What is similar, however, is the fact that the root is listed only once, and not separately for each ablauted form. In other words, a lexical entry will look something like this:

1. begVn: V, "start",
   [I]: present tense
   [æ]: past tense
   [ʌ]: participle

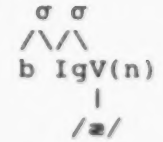
differing from total suppletion which would look like this:

1. begIn: V, "start", present tense
2. begæn: V, "start", past tense
3. begʌn: V, "start", participle

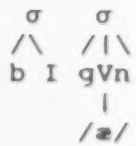
At the end of level 2, Tier Conflation takes place. A derivation is shown in (13).

(13)

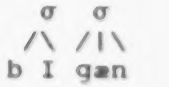
a. Level 1:



b. Level 2:



c. Post Level 2:



In both (13) a. and b., /æ/ is on a different tier from /bIgVn/. As a consequence, when Rule (3) applies at the beginning of Level 2, its S.D. is not met since at this point in the derivation /æ/ is not tautosyllabic with /n/. Only after Tier Conflation at the end of Level 2 (c.) does it become so. But after Level 2, the Tensing rule no longer applies, since, as I argued in Section 2.1, Tensing cannot be a post-lexical rule.

There is another (simpler) analysis of the ablauted forms which contradicts Kiparsky's claim that Ablaut occurs at Level 1. Recognizing Ablaut to be an inflectional process, we might group it with other inflectional processes at Level 2. In this case, Tensing occurs on the word cycle at the beginning of Level 2 to the underlying unablauted <u>begin</u>, where its structural description obviously is not met. Then the inflectional Ablaut rule applies. Since there is no evidence that word cycle rules persist into level 2, the ordering is sufficient to account for the facts.

<u>2.3.3 Clipping</u>

In addition to Ablaut, there is another group of forms which systematically does not undergo æ Tensing. These are truncations as shown in (14), from Schwarzschild (1985):

(14)

Janice [ǰænIs]	Jan [ǰæn] (?) judgement unclear
Cathy [kæθi]	Cath [kæθ]
cafeteria [kæfətIria]	caf [kæf]

The clipped forms in the right hand column are exceptions to the Tensing rule, since the consonants following æ are tautosyllabic with it and should therefore condition a change to E. The fact that the change does not occur requires an explanation.

If we conceive of Clipping to be like affixation at Level 2, an explanation similar to the second proposal for the ablauted forms seems plausible. A derivation for the clipped form Cath from Cathy is shown in (14).

(14)

Level 1

cycle 1	kæ.θi	Syllab.

Level 2

cycle 0	dna	Tensing
cycle 1	kæθ	Clipping

At Level 1 Cycle 1, CV Syllabification is assigned.

At the beginning of Level 2, Tensing cycles on the form which just exited Level 1, but does not apply because its structural description is not met. Only after Clipping takes place does that happen, but by then Tensing no longer applies.

2.3.4 Non-lexical Words

The final group of exceptions to æ Tensing are the forms in (15). Their pronunciations when bearing stress[6] are shown on the right:

(15)

can_{modal}	[kæn]
am	[æm]
an	[æn]
than	[ðæn]
and	[ænd]
have	[hæv]

These forms belong to a group of "non-lexical" words, so named for their failure to participate in lexical

6These words do not normally bear stress, but rather occur in reduced form. This is a diagnostic for non-lexical words

phonological and morphological processes. The group includes determiners, modals, auxiliaries and prepositions, and they stand distinct from the major lexical categories of nouns, verbs and adjectives. This distinction also coincides with the closed/open class distinction: non-lexical word classes are closed in the sense of being limited and fixed in number, while lexical words belong to open classes which are constantly expanding.

The reason Tensing does not apply to non-lexical words is that lexical rules do not cycle on them. It is not until the post-lexical phonology that these words become visible to syllabification, stress and post-lexical rules.

The lexical/non-lexical distinction can also explain the distribution of [θ] and [ð] in English. Kiparsky (1982), p.68, proposes the following lexical rule:

(16) θ --> ð in the onset of an unstressed syllable.

The reason function words the, than, that, etc. always appear with [ð] is that these words do not receive stress in the lexical phonology so at the point when the rule applies they do not fit its structural description, unlike thin, thick, thong, etc.

3. Philadelphia English: [æ] Tensing

Ferguson (1972), Labov (1981), describe a rule in Philadelphia English which can be translated into the following contemporary notation:

(17) æ--> E/ σ
/ \
_ {m,n,f,θ,s}

Rule (17) is very similar to Rule (3) for New York English except that the class of conditioning consonants in the Philadelphia rule is a subset of the conditioning consonants in the New York rule. The class of segments for the Philadelphia rule can be characterized as the set of all non-back nasals and voiceless fricatives, or in feature notation, [+anterior +nasal] and [+anterior -voice +continuant] (Ferguson (1972) p. 262). This rule also interacts with other phonological and morphological processes in a similar way. The chart in (17) shows some of these facts. In columm (A) we see underived forms in which æ Tensing at Level 2 does not apply because the vowel occurs in an open syllable. In (B) we see underived forms which meet the S.D. of Rule (17) and therefore undergo a vowel change. In column (C) are three groups of words which do not undergo the rule. First, Level 1 affixed forms do not have a vowel change because, as with the words in column

(A), the vowel is in an open syllable. Second, function words which have reduced forms as regular variants are excluded from the rule because they are not non-lexical and so do not undergo lexical rules--see Section 2.3.4. Third, Ablauted forms do not meet the S.D. of Rule (17) because the vowel ▪ is a morpheme on a separate tier from the root consonant which otherwise would condition a change (Section 2.3.2. The colloquial form wan, past tense of win follows the same pattern as the standard and archaic forms.

(18)

(A) Underived æ	(B) Underiv E	(C) Level 1 æ	(D) Level 2 E
castle	bath	passage	laughing
traffic	pan	classic	mannish
vanish	castor	classify	passing
hammer	ham	massive	passes
camera	amber		classes
tassel	can't		
grammar	jam		
banner	camp	Non-lexical	
flannel	staff	can than	
mathematics	draft	am and	
	after	an have	
	last		
	path	Ablaut	
	class	ran	
	pass	began	
	mass	hast	
	cram	hath	
	stand	swam	
	pan	wan (colloquial past tense of 'win')	
	fan		
	man		
	can		

Exceptions:

(E) æ	(F) E
math (clipping)	mad
crass	bad
lass	glad
gaff	

The exceptions in (E) are representative of larger classes. As in the New York dialect, clippings do not exhibit tense E--see Section 2.3.3. Moreover, there is a number of non-basic vocabulary such as crass, lass, gaff which one may hypothesize are learned late, and therefore

exhibit the more prestigious æ vowel. In fact, Ferguson (1972) notes there is a considerable amount of stylistic variation in the forms with expected E. One phonologically systematic group of exceptions contains /æ/ followed by sp, sf or sb (aspect, asphalt, asbestos). These forms never exhibit expected E but are always pronounced with æ. (F) contains three exceptional forms with E when æ is expected. Although phonologically they are a puzzle, he hypothesizes that their pronunciation has something to do with the fact that they are all monosyllabic adjectives of emotion. S[æ]d is an exception to this generalization, however.

In conclusion, the Tensing rule in Philadelphia English is explainable under the same analysis presented for New York English. Specifically, the same asymmetry between Level 1 and Level 2 affixed forms exists, so the hypothesis that Tensing applies at the 0 Cycle of Level 2 accounts for the alternations.

4. Evidence from Arabic

I will now discuss two rules in Arabic which are similar to Tensing in the following ways: They are syllable sensitive rules which apply in forms with Level 2 affixes

but do not apply in forms with Level 1 affixes. I will show how an analysis in which the rules in question apply on the 0 Cycle of Level 2 can account for the data.

4.1 Palestinian Arabic: [æ] Backing

Younes (1984) describes a rule which can be formalized as the following:

(19) /æ/ --> [a] / σ
/ \
_ r

(20)

ħajar	'stone'	
ħæjæri	'stoney'	(Level 1)
ħajari	'my stone'	(Level 2)
naar	'fire'	
næri	'fiery'	(Level 1)
naari	'my fire'	(Level 2)
šajar	'tree'	
šæjæri	'treelike'	(Level 1)
šajari	'my tree'	(Level 2)

The data in (20) show that this rule applies in a form with an inflectional affix meaning 'my' while it does not apply (as expected) in a form with a homophonous derivational affix meaning "-like". Thus Level 1 and Level 2 affixed forms, while identical syllabically on the surface, differ as to whether Rule (19) applies to them. Under the analysis given for English, these facts can be explained. Consider

the derivation in (21):

(21)

Level 1:	ɦæjæri		ɦajari
cycle 1	ɦæ.jæ(r)	Syllab.	hæ.jæ(r)
cycle 2	ɦæ.jær+i	Affix.	--
	ɦæ.jæ.ri	Syllab.	--
Level 2:			
cycle 0	dna	Rule (23)	ɦæ.jar
		V.Harmony	ɦa.jar
cycle 1	--	Affix.	ɦa.jar+i
	--	Syllab.	ɦa.ja.ri

At Level 1 ɦæjær is underlying in both forms, and the final C is extrametrical as in English. When the Level 1 affix is added, then syllabification takes place again to give ɦæ.jæ.ri in the left column. Since æ and a do not contrast underlyingly, Rule (19) is not structure preserving. Therefore it may not apply until the beginning of Level 2. Its structural description is not met in ɦæ.jæ.ri, but it is in ɦæ.jær. The latter changes to ɦa.jær, and subsequently harmonizes. Only after the rule applies does Level 2 affixation take place, and then Resyllabification.

4.2 Bedouin Hijazi Arabic: Liquid Emphaticization

The rule of /r,l/ emphaticization was discussed in Al-Mozainy (1981). The rule may be formulated as in (22), with examples in (23).

(22) /r,l/ --> [R,L]/ σ
/ \
a _

(23) 9aari 'naked' (Level 1) [9 = voiced pharyngeal
9aaRi 'my shame' (LEvel 2) fricative]

naari 'fiery' (Level 1)
naaRi 'my fire' (Level 2)

xaali 'empty' (Level 1)
xaaLi 'my uncle' (Level 2)

The following derivations show that the same analysis presented above works for this rule as well.

(24)	naari		naaRi
Level 1:			
cycle 1	naa(r)	Syllab.	naa(r)
cycle 2	naar+i	Affix.	--
	naa.ri	Syllab.	--
Level 2:			
cycle 0	n.a.	Rule (22)	naaR
cycle 1	--	Affix.	naaR+i
	--	Syllab.	naa.Ri

At Level 1, both forms are syllabified with final C's extrametrical. The Level 1 affix is then added on cycle 2, and the form is resyllabified with [r] as the onset to the last syllable. On Level 2, Rule (22) (also non-Structure Preserving) applies to the form on the right but not to the form on the left. Then Level 2 affixation and syllabification take place.

In the Arabic cases, the same principles of Syllabification, Structure Preservation and level ordering which accounted for English Tensing interact to produce the correct forms. None of the rules discussed introduces an underlying distinction, so they may not apply until Level 2 when Structure Preservation is no longer enforced. Moreover, the alternations between forms with Level 1 affixes and forms with Level 2 affixes is a direct result of the application of the rules at the beginning of Level 2, on the word cycle, before Level 2 affixation takes place.

4.3 Evidence for CV Syllabification in Level 2 Forms

By examining the behavior of stress assignment in the Bedouin Hijazi dialect of Arabic, we are able to find information about syllabification in the Level 2 cases. The Arabic stress rule assigns stress to a heavy penult,

otherwise to the antepenult. If we can show that stress is not on the penult in the Level 2 forms, then (assuming that Level 2 forms are in the domain of stress assignment) there must be a CV rule application at Level 2 after the affix is added. This conclusion would support an analysis with a word cycle at the beginning of Level 2 over an analysis (mentioned in Footnote 4) in which Level 2 forms preserve the syllabification of the stem. The relevant examples for this test are in (20): ħajari 'my stone' and šajari 'my tree', both with Level 2 affixes. In fact, stress is assigned to the antepenult in both words (just as in the Level 1 forms ħæjæri 'stoney' and šæjæri 'treelike'). What this shows is that at the point where Stress is assigned, the syllabification of the Level 2 forms must be CV.CV.CV rather than CV.CVC.V. The former syllabification is incompatible with an analysis in which Backing takes place after Level 2 affixation, unless an order is stipulated:

Affixation	ħæ.jær.i
Backing, Harmony	ħa.jar.i
CV Syllabification	ħa.ja.ri
Stress	ħa'.ja.ri

In this case we would have to explain why Backing alone

takes place before CV Syllabification while all other rules follow it. In other words, there is no other evidence that the Level 2 form was ever syllabified ña.jar.i. It seems to behave just like the Level 1 form with regard to stress. This fact, then, supports an analysis in which Backing applies on the word cycle before Level 2 affixation.

5. Concluding Remarks

In this paper, I have investigated the interaction of ɐ Tensing with several principles of Syllabification and grammatical organization. Below I will summarize the issues that were raised.

First, this analysis is compatible with the principle of Structure Preservation, which blocks the application of rules which do not produce phonemes in the Level 1 phonology. My analysis indicates, however, that Structure Preservation does not hold of Level 2 phonology, a conclusion also reached by Borowsky (1986), among others.

Second, I utilize the notion of a word cycle at the beginning of Level 2 to explain the asymmetry between forms with Level 1 affixes and forms with Level 2 affixes. This cycle involves only material left from Level 1, so it provides the crucial place in the derivation where the syllabification of the two forms differs with respect to

the consonant which conditions the Tensing rule.

In all other regards, syllabification of Level 1 and Level 2 affixes proceeds identically. In particular, I claim that vowel-initial affixes of both types syllabify immediately with the final consonant of the root as onset. The fact that Arabic assigns the same stress to Level 1 and Level 2 forms which display an asymmetry similar to the Tensing cases in English supports this hypothesis.

I outline two possible analyses of English Ablaut. The first is a suggestion that Ablaut is a subsystem of English morphology in which root morphemes and tense morphemes are represented on separate tiers. Thus, the past tense morpheme /æ/ in <u>began</u> is not tautosyllabic with /n/ at the point in the derivation where æ Tensing applies. It is not until the end of Level 2, when Tier Conflation occurs, that the two become tautosyllabic. At this point, lexical rules (including Tensing) have ceased to apply. The second analysis claims that Ablaut is an inflectional process at Level 2. In this case, it is ordered after the Tensing rule, which explains the unexpected behavior of these verbs.

I suggest that clipping is a morphological process at Level 2. Consequently, it does not undergo Tensing which applied on the word cycle before the Level 2 morphology.

Finally, the Arabic data suggest that the analysis has

applicability beyond the scope of English. First, they show that syllable-sensitive, non-structure preserving rules in other languages apply differently in Level 1 and Level 2 forms. Second, the analysis presented explains the alternations in a straightforward way. Third, Arabic stress facts suggest that CV syllabification applies in words with Level 2 affixes, further motivating an analysis referring to the word cycle.

Appendix: Data

Notes:
1. The forms marked in brackets are Philadelphia English (PE) data; all the forms listed occur in New York English.
2. Those which appear in parentheses display variation in the speech of at least one informant; that is, they may be pronounced with either [æ] or [E].

(1) Underived forms with [E]:
[psychopath
mass
class
can
pass]

(2) Underived forms with [æ]:
[cannibal
Janice
Cathy
cafeteria]
savvy
caddy
tabby
[Titanic
damage
manage]
ravage
[famish]
lavish
ravish
[fashion]
blabber (verb)
ladder
bladder
badger
swagger
stagger
[hammer
stammer
banner
manner
panorama
traffic]

(3) Hypothesized Level 1 forms with [æ] (Those marked with a "?" may be underived, but at least it is sure that

they are not Level 2. [æ] is predicted in both underived and in Level 1 forms):

[passage]

[nanny]
Daddy
Paddy

[sanify
ramify
pacify

Indiana?]

syllabic
[thoracic]
nomadic
sporadic?
triadic
magic ?
tragic ?
[telepathic (except PE informant EB)
psychopathic (except PE informant EB)
dynamic ?
panoramic
manic
organic
mechanic
Germanic
panic ?
Hispanic
puritanic
Jurassic ?
Triassic ?
classic (except PE informant EB)

(massive) (except PE informant EB)
(passive) (" " " ")]

cavity
gravity
depravity
alacrity ?
[amity
calamity ?
profanity
Christianity]

humanity
sanity
vanity
vivacity
opacity
capacity
tenacity
audacity

exclamative

jagged
ragged*

affable
inflammable
irascible

Spanish
banish

mammal

ceramist
pianist
Babist

(4) Hypothesized Level II forms with [E]

clammy
trashy
flashy
ashy
splashy
zigzaggy
saggy
craggy
shaggy

---

*The words jagged and ragged seem at first glance to have an affix which is classified by Selkirk (82) as Level 2 (a N-->A -ed suffix as in talented. My data contradict this classification. At least jagged does not have a transparent stem, so on that basis may be considered Level 1. Ragged, on the other hand, does have a recognizable stem, but seems to group with Level I affixes anyway.

baggy
(shabby)
(flabby)
scabby
cabby
[grassy
classy
brassy]

[laughable
tannable
passable
surpassable]
addible

padding
bagging
flagging
(wagging)
[laughing
dashing
lashing
thrashing
damning
canning]
halving
[passing]

[baddish
faddish]
saddish
[calfish
clammish
clannish
mannish]

faddism

[madden] (see Section 3)
sadden

grabber
stabber
lagger
[basher
dasher
slasher
masher]

smasher
planner
tanner
fanner

madder
maddest
gladdest
saddest

} see Section 3

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